TABLE 2.—*Vapor pressures at pyrheliometric stations on days when solar radiation intensities were measured.*

Washington, D. C.			Madison, Wis.			Lincoln, Nebr.			Santa Fe, N. Mex.		
Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.	Dates.	8 a.m.	8 p.m.
1916.	*Mm.*	*Mm.*	1916.	*Mm.*	*Mm.*	1916.	*Mm.*	*Mm.*	1916.	*Mm.*	*Mm.*
Oct. 1	4.37	6.27	Oct. 3	7.04	7.04	Oct. 2	2.62	10.97	Oct. 2	5.36	3.30
6	14.10	16.20	4	7.57	8.18	3	9.47	10.97	3	3.45	2.26
7	13.13	11.81	6	5.36	6.76	4	11.81	9.14	6	6.27	5.16
8	11.38	15.65	7	7.87	11.38	6	5.56	10.59	16	4.57	5.16
9	13.61	16.20	10	3.99	3.63	10	3.45	3.81	17	4.57	6.50
10	4.37	4.95	13	6.76	4.75	13	5.36	4.37	18	4.95	4.37
11	4.37	6.27	17	3.00	3.63	16	7.04	4.95	19	3.15	2.26
12	6.02	7.87	27	5.36	5.36	17	4.37	4.57	20	2.49	3.00
14	5.16	5.16	.....	.....	.....	20	1.60	2.87	21	2.87	3.15
17	13.61	5.16	.....	.....	.....	21	3.45	4.95	25	3.63	3.81
21	4.95	5.16	.....	.....	.....	25	4.37	5.16	26	3.15	3.81
23	4.75	5.79	.....	.....	.....	26	4.57	6.50	27	3.00	4.57
24	5.79	7.29	.....	.....	.....	27	4.57	7.29	28	4.75	2.62
25	5.79	9.47	.....	.....	.....	31	4.37	5.16	30	2.74	5.36
26	4.57	5.79	.....	.....	.....	.....	.....	.....	31	2.62	3.00
27	4.75	5.36	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	5.56	6.02	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table 3 shows about the normal amount of radiation for the month at Washington, a slight excess at Madison, and a deficiency of about 6 per cent at Lincoln.

TABLE 3.—*Daily totals and departures of solar and sky radiation during October, 1916.*

[Gram-calories per square centimeter of horizontal surface.]

Day of month.	Daily totals.			Departures from normal.			Excess or deficiency since first of month.		
	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.	Washington.	Madison.	Lincoln.
1916.	*Gr.-cal.*	*Gr. cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*
Oct. 1	470	399	226	125	115	−136	125	115	−136
2	364	378	394	23	97	35	148	212	−101
3	244	380	427	− 93	102	71	55	314	− 30
4	296	369	401	− 38	94	48	17	408	18
5	279	339	379	− 51	67	29	− 34	475	47
6	373	387	373	46	118	26	12	593	73
7	369	362	366	45	96	22	57	689	95
8	356	297	387	34	33	46	91	722	141
9	250	341	185	− 69	80	−153	22	802	− 12
10	467	396	399	151	138	64	173	940	52
11	396	329	191	83	74	−141	256	1,014	− 89
12	337	51	303	26	−202	− 26	282	812	−115
13	130	375	413	−178	125	87	104	937	− 28
14	404	322	334	99	75	11	203	1,012	− 17
15	234	182	80	− 68	− 62	−240	135	950	−257
16	108	284	363	−192	43	47	− 57	993	−210
17	332	351	393	35	112	80	− 22	1,105	−130
18	280	254	303	− 4	18	− 7	− 26	1,123	−137
19	90	203	126	−202	− 31	−181	−228	1,092	−318
20	211	33	434	− 78	−198	130	−306	894	−188
Decade departure							−479	−46	−240
21	368	162	365	82	− 66	65	−224	828	−123
22	297	112	289	13	−114	− 8	−211	714	−131
23	360	80	75	79	−143	−219	−132	571	−350
24	339	108	24	61	−112	−267	− 71	459	−617
25	287	64	369	11	−154	82	− 60	305	−535
26	354	182	330	80	− 33	46	20	272	−489
27	324	321	340	52	108	59	72	380	−430
28	324	151	172	54	− 60	−106	126	320	−536
29	289	38	287	22	−170	12	148	150	−524
30	160	273	173	−105	67	− 99	43	217	−623
31	308	270	307	− 55	66	38	− 12	283	−585
Decade departure							+294	−611	−307
Excess or deficiency since first of year:									
Gr.-cal							−5,531	3,286	
Per cent							−4.7	+2.9	

If we extrapolate the radiation intensities obtained on the best days to air mass 1 (zenithal sun) and air mass zero (upper limit of the atmosphere) by the method illustrated in the REVIEW for September, 1915, **43**:441, fig. 1, and then employ the latter in connection with the vapor pressures given in Table 2 to compute the solar constant by the Smithsonian "Abridged procedure for determining approximately the value of the solar constant," [1] the values in Table 4 result. The values of the solar constant obtained from the measurements made at Madison, Lincoln, and Santa Fe, are in good accord. Those obtained from Washington observations are too low, as we might expect, since during the fall months the tendency must be for vapor pressure readings near sea level to give too low a value for the total vapor content of the atmosphere.

TABLE 4.—*Radiation intensities for zenithal sun, reduced to mean solar distance of the earth, and approximate values of the solar constant.*

[Gram-calories per minute per square centimeter of normal surface.]

Station.	Date.	Radiation intensity.		Solar constant.
		m=1	m=0	
	1916.	*Gr.-cal.*	*Gr.-cal.*	*Gr.-cal.*
Washington, D. C.	Oct. 10, p. m.	1.49	1.71	1.84
	Oct. 26, a. m.	1.41	1.68	1.82
	Oct. 28, a. m.	1.43	1.69	1.83
Madison, Wis.	Oct. 10, a. m.	1.55	1.76	1.88
Lincoln, Nebr.	Oct. 3, a. m.	1.47	1.72	1.94
	Oct. 4, a. m.	1.40	1.66	1.88
	Oct. 13, a. m.	1.59	1.78	1.92
	Oct. 17, p. m.	1.53	1.76	1.89
	Oct. 25, a. m.	1.63	1.83	1.97
	Oct. 27, p. m.	1.58	1.83	1.99
	Oct. 31, p. m.	1.58	1.82	1.96
Mean				1.94
Santa Fe, N. Mex.	Oct. 3, a. m.	1.60	1.78	1.88
	Oct. 17, p. m.	1.54	1.71	1.85
	Oct. 19, p. m.	1.65	1.90	2.00
	Oct. 20, a. m.	1.63	1.80	1.90
	Oct. 25, p. m.	1.57	1.74	1.85
	Oct. 26, a. m.	1.63	1.78	1.89
	Oct. 26, p. m.	1.58	1.74	1.85
	Oct. 28, a. m.	1.57	1.70	1.83
	Oct. 30, a. m.	1.62	1.79	1.91
	Oct. 31, a. m.	1.61	1.76	1.86
Mean				1.88

Unusually high radiation intensities were measured at Lincoln, Nebr., on the morning of October 20, following a fall of about 4 inches of snow. By noon, however, the atmospheric transmission had diminished, so that the radiation intensity for air mass 1.5 had not increased over that obtained for air mass 2.0.

Skylight polarization measurements made at Washington on 14 days give a mean of 56 per cent and a maximum of 61 per cent on the 10th. This latter, which is 9 per cent less than the October maximum of 1915, is surprisingly low; since on several days, and notably on October 10, distant mountains could be seen with unusual clearness.

ADDITIONAL NOTE ON THE HIGH HAZE OF JULY AND AUGUST, 1916.

By HERBERT H. KIMBALL, Professor of Meteorology.

[Dated: Washington, D. C., Dec. 4, 1916.]

In response to the request in connection with the note on "High Haze" in the August, 1916, REVIEW, **44**:433-434, the following description has been received from Mr. Cleve Hallenbeck, assistant observer, Weather Bureau, Roswell, N. Mex.

[1] Annals, Astrophysical Observatory of the Smithsonian Institution, Washington, 1908, **2**: 115.

THE HIGH HAZE OF AUGUST 2–4,1916, AT ROSWELL, N. MEX.

This haze was first observed during the forenoon of August 2. It grew denser as the day advanced, and was dense enough in the late afternoon to entirely obscure the sun 35 minutes before sunset. That it was a high haze is indicated by the fact that although it obscured the sun the few cumulus clouds in the sky were distinctly visible. The outlines of these clouds seemed to be slightly dimmed, but this may have been due to the hazy background. The haze was the densest I have ever observed, and the only one observed during five years in the semiarid West.

On the 3d and 4th the haze, while lighter, was still dense enough to obscure the higher clouds, if there were any. On each of the three days the sunlight had a noticeable red or orange effect, most noticeable, of course, on the 2d. Other than a dull red glow, there was no unusual display of sunrise or sunset colors.

Judging by the comments made by callers at the Weather Bureau office, each of whom had an explanation to offer on this phenomenon, it seems that haze is extremely rare in this section of the country.

As a possible explanation of this haze Riccò[1] communicates the following:

I wish to state that in July a strong outburst occurred of the Stromboli volcano, and that on July 4 there was an extraordinary eruption of fluid and incandescent lava to a great height, followed by a thick rain of lapilli and ashes. The emission of enormous columns of black cloud lasted many days.

Stromboli volcano is on a small island of that name in latitude 38° 50′ N., longitude 15° 10′ E.

Referring to my previous notes in the REVIEWS for July and August, 1916, **44**:382, 433–34, it will be seen that observations in the high Alps at an approximate latitude of 47° N., and longitude 8° E., show the presence of high haze about the middle of July.

In the United States, pyrheliometric observations show its presence at Washington, D. C., latitude 38° 54′ N., longitude 77° 03′ W., on July 29–30; at Madison, Wis., latitude 43° 05′ N., longitude 89° 23′ W., on July 27–29; and at Lincoln, Nebr., latitude 40° 49′ N., longitude 96° 45′ W., on July 29. At Santa Fe, N. Mex., during the third decade in July, the skies were too cloudy for pyrheliometric observations.

Furthermore, eye observations show that high haze prevailed at Roswell, N. Mex., latitude 33° 24′ N., longitude 104° 27′ W., on August 2–4, and there is evidence of its presence in southern California at both Mount Wilson and Los Angeles, latitude about 34° N., longitude about 118° W., during the latter part of July, although it did not reach its maximum intensity until early in August. Its presence at Mount Wilson is confirmed by spectro-bolometric measurements. It was also observed at the Lick Observatory, Mount Hamilton, Cal., latitude 37° 20′ N., longitude 121° 38′ W., during the first week in August, but no evidence of its presence was noticeable on Mount Rainier, Wash., latitude 47° N., longitude 122° W., between July 28 and August 4.

The brilliant twilight colors which accompanied the onset of this haze in California have continued up to November 1, although with diminishing intensity. Since August 1 pyrheliometric observations have given no indication of the presence of the dust, but at Washington a surprising decrease in skylight polarization has continued up to the 1st of December. Even on days when distant mountain ranges have stood out with unusual clearness the percentage of skylight polarization has been nearly 10 per cent less than has been measured on previous years under apparently similar atmospheric conditions.

In order that volcanic dust might reach southern California during the latter part of July, or 20 days after the violent eruption of Stromboli on July 4, an average wind movement from the east of about 7 meters per second, or 15 miles per hour is necessary; and to reach Washington, D. C., and Madison, Wis., by July 29, and Roswell, N. Mex., by August 2, a velocity of 4 meters per second, or 9 miles per hour, is necessary. If we suppose the movement to have been from west to east, velocities of 11.2 meters per second (25 mis. / hr.) must have been maintained. Our knowledge of upper air currents gained from recent balloon observations[2] assures us that such velocities are possible; but if the movement of the smoke cloud was by the shorter route, or from east to west, the volcanic explosion must have been of sufficient violence to project the dust to a height of at least 16 kilometers.

It is hoped that Professor Riccò has measurements which he will publish, showing the height of the smoke cloud at the time of the eruption; since if we attribute the high haze of 1916 to the eruption of Stromboli volcano on July 4, such measurements will give the observations here summarized considerable value in studies of atmospheric circulation.

[1] *Riccò, A.* Optical deterioration of the atmosphere and volcanic eruptions. Nature (London), Nov. 9, 1916, 98:190.

[2] *Blair, W. R.* Free-air data by means of sounding balloons, Fort Omaha, Nebr., July, 1914. MONTHLY WEATHER REVIEW. May, 1916, 44:247–264.